Four new species of the silkmoth genus *Samia* (Lepidoptera: Saturniidae)

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Abstract: During preparation of a revision of the silkmoth genus *Samia* Hübner 1819 ("1816"), (Saturniidae) a large amount of material from Asia in institutional and private collections was examined by the authors, and in recent years additional material from areas which were not previously well represented in collections became available. Some species were found to be undescribed, although some of them have been collected commonly for over 100 years and are not rare in collections. Other species were only collected quite recently in quantity, which made comparisons possible and geographical distributional data available. As the work on the revision is not yet completed, we decided to make the names for those undescribed species available in this work; a survey with all distributional data, literature citations, and further information will be published later in the revisional work. Here we describe the following species: *Samia* ***abrerai*** **spec. nov.** from Bali and Java islands, Indonesia, male holotype in The Natural History Museum, London; *Samia* ***naessigi*** **spec. nov.** from Halmahera Island, Indonesia, male holotype in Zoologisches Museum der Humboldt-Universität, Berlin; *Samia* ***kohlli*** **spec. nov.** from South East Asian mainland, male holotype from West Malaysia in Zoologisches Museum der Humboldt-Universität, Berlin; and *Samia* ***wangi*** **spec. nov.** from southern mainland China, Hainan, Taiwan, and Vietnam, male holotype from Guangdong Province, China, in the Natural History Museum of Los Angeles County, Los Angeles. All holotypes are figured in color.

Key words: Saturniidae, *Samia,* wild silkmoths, new species, South East Asia, China, Bali, Java, Halmahera, Indonesia, West Malaysia

Vier neue Arten der Seidenspinnergattung *Samia* (Lepidoptera: Saturniidae)

Zusammenfassung: Während der Vorbereitungen der Revision der Saturniidengattung *Samia* Hübner 1819 („1816") wurden mittlerweile große Mengen an Sammlungsmaterial in diversen asiatischen, europäischen und amerikanischen Museen und Privatsammlungen eingesehen und untersucht. Zusätzlich wurde in den letzten Jahren vermehrt versucht, durch eigene und fremde Expeditionen an Belege aus Gegenden zu kommen, die bisher nicht oder nicht ausreichend in diesen Sammlungen vertreten waren; mehrere Arten konnten so schon als neu beschrieben werden (Naumann & Näss ig 1995, U. Paukstadt et al. 1998, Naumann 1998). Von einigen Arten liegen jedoch in verschiedenen Museen Belegstücke vor, die bereits vor etwa 100 Jahren gefangen wurden und die teilweise auch heute in Sammlungen nicht selten sind, jedoch bisher durch die Verwirrung in der Literatur nicht als unbeschriebene Taxa erkannt und immer wieder bereits benannten Arten zugeordnet wurden. Da die Arbeiten an der Revision noch nicht abgeschlossen sind, einige Arten aber gut durch ihre externe Morphologie zu definieren sind, haben wir uns entschlossen, vorab die Namen für diese Taxa verfügbar zu machen; ein Gesamtüberblick mit genaueren und weiteren Fundortdaten, Literaturzitaten und sonstigen Informationen wird in der Gattungsrevision dargestellt, im vorliegenden Artikel beschreiben wir lediglich folgende Arten als neu: *Samia* ***abrerai*** **spec. nov.** von Bali und Java, Indonesien, männlicher Holotypus in The Natural History Museum, London; *Samia* ***naessigi*** **spec. nov.** von der Insel Halmahera, Indonesien, männlicher Holotypus im Zoologischen Museum der Humboldt-Universität zu Berlin; *Samia* ***kohlli*** **spec. nov.** vom südostasiatischen Festland, männlicher Holotypus aus Westmalaysia ebenfalls im Zoologischen Museum der Humboldt-Universität zu Berlin; und *Samia* ***wangi*** **spec. nov.** aus den südlichen Bereichen der Volksrepublik China, von Taiwan und dem nördlichen Vietnam, männlicher Holotypus aus der chinesischen Provinz Guangdong im Natural History Museum of Los Angeles County, Los Angeles. Sämtliche Holotypen werden dorsal und ventral in Farbe abgebildet.

Introduction

The genus *Samia* Hübner 1819 ("1816") (= *Philosamia* Grote 1874) is currently being revised by us. It contains more than 15 species of large sized moths from tropical and temperate eastern Asia, two of which were introduced to several countries around the world for their silk in the 19th century (Peigler 1992). Because the species superficially resemble one another, most have traditionally been considered to be subspecies of *S. cynthia* (Drury 1773). This confusion has persisted into recent literature, in which many species were cited under the wrong names (e.g. Allen 1981: 111, Barlow 1983: 152, Lampe 1984: 5, Holloway 1987: 113, Paukstadt & Paukstadt 1991: 89 ff., Paukstadt et al. 1994: 51, D'Abrera 1998: 86). Other new species have been described in recent years (Naumann & Nässig 1995, Paukstadt et al. 1998, Naumann 1998).

This paper describes four species, considered by us to be previously unnamed, based on our examination of all extant primary type specimens, original descriptions for all names, and a large sample of pinned specimens of moths in this genus. Our only purpose here is to describe and name these taxa, and to define their known geographical distributions. Much more detail on the synonymies, life histories, phylogeny, and variation will be provided in the forthcoming revision. Moths in the genus *Samia* do not show significant sexual dimorphism, so we only provide a few comments pertaining to the females. The male genitalia are more diagnostic, and therefore males were selected as holotypes for these new species. It is with pleasure that we dedicate these new species to

[1] 7th contribution to the Saturniidae fauna of China (6th contribution: Nachrichten des Entomologischen Vereins Apollo, Frankfurt am Main, N.F. **21** (4): 201–206, 2001).

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our colleagues who have helped both of us for several years in our study of this genus.

Abbreviations cited in the type lists for the collections are as follows:

AS	Institute of Zoology, Academia Sinica, Beijing, People's Republic of China.
Beeke	Martin Beeke, Hille, Germany.
Brechlin	Ronald Brechlin, Pasewalk, Germany.
Brosch	Ulrich Brosch, Hille, Germany.
BMNH	The Natural History Museum [formerly British Museum (Natural History)], London, United Kingdom.
Kohll	Steve Kohll, Kayl, Luxembourg.
LACM	Natural History Museum of Los Angeles County, Los Angeles, California, USA.
Lampe	Rudolf Lampe, Nürnberg, Germany.
Löffler	Swen Löffler, Lichtenstein, Germany.
Meister	Frank Meister, Prenzlau, Germany.
MHNL	Muséum d'Histoire naturelle de Lyon, Lyon, France.
MNHN	Muséum National d'Histoire naturelle, Laboratoire d'Entomologie, Paris, France.
MTD	Staatliche Naturhistorische Sammlungen Dresden, Museum für Tierkunde, Dresden, Germany.
MZB	Museum Zoologicum Bogoriense, Cibinong, Bogor, West Java, Indonesia.
Nässig	Wolfgang A. Nässig, collection now deposited in SMFL.
Naumann	Stefan Naumann, Berlin, Germany.
Paukstadt	Laela Hayati Paukstadt, Wilhelmshaven, Germany.
Peigler	Richard S. Peigler, San Antonio, Texas, USA.
RMNH	Nationaal Natuurhistorisch Museum, Naturalis, Leiden, The Netherlands [formerly Rijksmuseum van Natuurlijke Historie].
SAF	Shaanxi Academy of Forestry, Shaanxi, Peoples' Republic of China.
SMFL	Senckenberg-Museum (Lepidoptera collection), Frankfurt am Main, Germany.
TM	Taiwan Museum, Department of Zoology, Taipei, Taiwan.
TNM	National Museum of Natural Science, Taichung, Taiwan.
UMO	Oxford University Museum of Natural History (Hope Entomological Collections), Oxford, United Kingdom.
Witt	Museum Witt, München, Germany.
ZFMK	Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn, Germany.
ZMA	Instituut voor Systematiek en Populatiebiologie (Zoölogisch Museum), Afdeling Entomologie, Amsterdam, The Netherlands.
ZMHB	Zoologisches Museum der Humboldt-Universität, Berlin, Germany.

Samia abrerai spec. nov.

Holotype (figs. 1, 2): ♂, Indonesia, Bali Island, Buleleng District, West Bali National Park, road Pucaksari–Sepang, 650 m, 25 Dec 1998, 1.10 h, secondary forest and coffee-nutmeg-plantations, leg. Naumann (Coll. Naumann). A red holotype label will be fixed accordingly. The holotype will be deposited in the BMNH in London when the revision of the genus is completed.

Paratypes (48 ♂♂, 7 ♀♀ from Bali, 44 ♂♂, 31 ♀♀ from Java):

Allotype: ♀, Indonesia, Bali Island, Buleleng District, Lake Tamblingan, 1105 m, 9–10 Jan 2000, leg. U. Paukstadt, coll. W. A. Nässig (SMFL).

A red allotype label will be fixed accordingly. The other paratypes with blue paratype labels.

Indonesia, Bali Island:

Tabanan District: 1 ♂, E. Bali, Batoeriti, 3500 ft, April 1936, leg. J. P. A. Kalis, Rothsch. Bequest (BMNH); 1 ♂, Batukau, April 1997 (Naumann); 1 ♂, Mt. Bedugul, 1100 m, Nov 1982 at light, leg. Paukstadt, GP 360 Paukstadt (Paukstadt); 3 ♂♂, 1 ♀, Bedugul, 1300 m, May 1998 (Paukstadt); 2 ♂♂, Bedugul, 1200 m, Sept & Oct 1998 (Naumann); 2 ♂♂, 1 ♀, Bedugul env., 1350 m, Nov 1999, leg. local people (Paukstadt); 4 ♂♂, same locality, Jan 2000, leg. local people (Paukstadt); 2 ♂♂, same data (Nässig); 1 ♂, same data (Brechlin); **Buleleng District:** 1 ♂, West Bali Reserve, Titap, near Papuan, rainforest, 550 m, 8°25'N 114°58'E, 29–30 Jan 1998, leg. Jakl, Schintlmeister, & Cervenka, GP 275/98 Naumann (Naumann); 1 ♀, same data (Brechlin); 8 ♂♂, West Bali National Park, Pucaksari–Sepang, 650 m, 25 Dec 1998, leg. Naumann, GP 355 & 356/99 Naumann (Naumann); 2 ♂♂, same data (Peigler); 1 ♂, 1 ♀, Lake Buyan, 1550 m, ex pupa Aug 1991 on avocado, leg. Paukstadt, GP 362 Paukstadt (Paukstadt); 4 ♂♂, Lake Tamblingan, 1105 m, 4–5 Jan 2000, leg. U. Paukstadt (Paukstadt); 1 ♂1 ♀, same data (Brechlin); 1 ♂, same data (Nässig); 4 ♂♂, same locality, 8–9 Jan 2000, leg. U. Paukstadt (Paukstadt); 3 ♂♂, same locality, 9–10 Jan 2000, leg. U. Paukstadt (Paukstadt); 1 ♂, same data (Brechlin); 1 ♂, same locality, 1050 m, 7 July 2000, leg. local people (Paukstadt); 1 ♀, same locality, ex ovo 20 June 2000, cult. L. H. Paukstadt (Paukstadt); **Bangli District:** 1 ♂, N. Bali, 2 km W Penulisan, 1650 m, 28 Dec 1998, leg. Naumann, GP 357/99 Naumann (Naumann); 1 ♂, N. Bali, Batur village, Pura Batur Temple, 1650 m, found dead on ground, 28 Dec 1998, leg. Naumann (Naumann).

Indonesia, Java Island:

West Java: 1 ♀, West Java, Sindanglaya, 1882 in coitu (RMNH); 1 ♀, Preanjer, 1888 (RMNH); 1 ♂, 1 ♀, Vulkan Gede, West Java, 1893, Grel., coll. Staudinger, GP 329/98 Naumann (ZMHB); 1 ♀, Gouv. Kina-Ondern, Malabar Geb. [Mts.], Tjinjiroean, 1700 m, Nov 1909, leg. V. d. Weele (RMNH); 1 ♀, Buitenzorg [Bogor], June 1927, leg. Frangenheim (ZMA); 1 ♀, W. Java, Tjibodas, 1400 m, 4 June 1940, leg. L. J. Toxopeus (MZB); 1 ♂, W. Java, Tjibodas, S. Sukabumi, 1400 m, 27 Sept 1940, leg. A. M. Neervoort (MZB); 1 ♂, same locality, 20 June 1956, leg. A. M. R. Wegner, GP 319/98 Naumann (SMFL); 1 ♂, Umgebung Bogor, Dec 1994 (Meister); 5 ♂♂, W. Java, Mt. Ranung, Sempolan, 410 m, sec. forest, 8°10'N 113°40'E, 28 Jan 1998, leg. Jakl, Schintlmeister, & Cervenka (Brechlin); 3 ♂♂, Prov. Jawa Barat [West], Gg. [Mt.] Karang, ca. 1400 m, Pandegalang, Baya [ca. 80 km W Jakarta], Dec 1998, leg. local people, GP 889, 890, 894 Paukstadt (Paukstadt); 4 ♂♂, West Java Province, S slope Mt. Papandayan (2622 m), 1590 m, Kramat Wangi, 31 Dec 1999/1 Jan 2000, leg. U. Paukstadt (Paukstadt); 2 ♂♂, West Java Province, S slope Mt. Papandayan (2622 m), 1590 m, Kramat Wangi, 13–15 Jan 2000, leg. U. Paukstadt (Paukstadt); 1 ♂, same locality, 1480 m, 15/16 Jan 2000, leg. U. Paukstadt (Paukstadt); 5 ♀♀, Gn. Halimun, 1300 m, March 2000, leg. local people (Paukstadt); **East Java:** 1 ♀, Java O.K. [east coast], Kadiri [Kediri], 1913, coll. v. d. Bergh (ZMA); 1 ♂, S. Java, Malang, coll. Poujade 1909, *Samia cynthia* var. *insularis,* det. E. L. Bouvier, GP 229/97 Naumann (MNHN); 1 ♂, East Java, Nonkodjadjar [E. Malang], 4000 ft,

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June 1934, leg. J. P. A. Kalis (BMNH); 1 ♂, Tengger, Nonkodjadjar, Nov 1934, leg. J. P. A. Kalis, coll. van Groenendael (ZMA); 1 ♀, Tengger, Singalangoe, 5000 ft, May 1934, leg. J. P. A. Kalis, coll. Rothschild (BMNH); 4 ♂♂, 6 ♀♀, Djoenggo-Ardjoeno, 4500 ft, July 1935, Jan & July 1936, July, Aug, Sept 1939, leg. J. P. A. Kalis, coll. van Groenendael, GP 305 & 306/98 Naumann (ZMA); 3 ♂♂, 2 ♀♀ Mt. Argopuro, 1 ♂, 1 ♀ Dec 1997, 1 ♂, 1 ♀ Jan 1998, 1 ♂ 1998, GP 358 & 359/99 Naumann (Naumann); 3 ♂♂, 6 ♀♀, Mt. Argopuro, 2 ♀♀ Dec 1997, 1 ♂, 3 ♀♀ Jan 1998, 1 ♀ Feb 1998, 2 ♂♂ April 1998 (Paukstadt), 2 ♂♂, same data (Peigler); 1 ♂, same locality, April 1998 (Brosch); 4 ♂♂, 1 ♀, Jawa I., Prov. Jawa Timur [East], Gg. [Mt.] Sidoramping, 23–25 Oct 1998, leg. local people, GP 897, 898, 899, 900 Paukstadt (Paukstadt); 3 ♂♂, East Java Province, W slope Mt. Argopuro (3088 m), 580 m, Tiris, 10/11 Jan 2000, leg. U. Paukstadt (Paukstadt); **without exact locality:** 1 ♂, Java, coll. Staudinger & Bang-Haas (MTD); 1 ♀, Java, leg. M. R. Piepers (RMNH); 1 ♂, 1 ♀, Java, [19]32 (MHNL); 1 ♀, Blawan [not located on maps], 15 March 1934, leg. W. K. J. Roepke (RMNH).

Some of the specimens ex colls. Naumann and Peigler will be deposited in institutional collections (LACM, ZMHB).

Derivatio nominis: This species is named in honor of our friend Bernard D'Abrera in recognition of his recent valuable publications on Saturniidae. He was the first to show clearly that two species of *Samia* fly sympatrically on Java (D'Abrera 1998: 87). He also alerted us to the important fact that Drury's original type specimens of *Samia cynthia* are still extant in Australia, which we have since successfully located and examined. That discovery made it possible to determine with certainty that *Samia walkeri* Felder & Felder 1862 is a synonym of *S. cynthia,* and that *S. wangi* described below was actually an unnamed species.

Description. ♂: Ground color olive brown, antenna totally quadripectinate, with ca. 31 segments, 10.0 to 11.6 mm long (average 11.0 mm, n = 17), rami in maximum 2.1 to 2.4 mm (average 2.3 mm, n = 17). Frons, thorax and abdomen also in ground color, each separated by whitish collar, the same as with the basis of the antenna and one dorsal and two lateral rows of abdominal tufts.

Right forewing length 65 to 70 mm (average 67.5 mm, n = 17, holotype 70 mm), wings with typical *Samia* pattern, but species typical elements: On forewing the antemedian and median area in ground color, separated with a broad white median band which is anteriorly somewhat pinkish, posteriorly a little darker. Ocellus 14 to 17 mm long, anteriorly slightly covered with black scales, then with ca. 1.5 mm broad scaleless hyaline area, posteriorly with up to 2 mm broad yellow border, and with its tip bulging the postmedian band. This band is most typical for the species to differ from *S. insularis* Snellen van Vollenhoven 1862, which flies sympatrically in Java, and much broader and intensively colored in black, white and whitish pink than in the latter one. Postmedian area anteriorly much lighter and this part also more narrow, posteriorly much darker than in *S. insularis,* and the forewing apex dark lilac (*S. insularis:* pink) and nearly rounded at first outer tip, not as falcate as in *S. insularis*. Subapical spot 4.5 to 5 mm in maximum diameter, most specimens with slightly outlined black dot below this ocellus.

All the same pattern elements also on the hindwing. Ocellus more halfmoon-like, 9 to 11.5 mm in diagonal maximum diameter (average 10.4 mm, n = 17). Pinkish parts of postmedian band here indented at the veins, and the outer margin with a relatively broad greyish inner submarginal line, broken at the veins. On the underside all the same pattern elements, but antemedian line only slightly outlined.

♂ genitalia (fig. 9): Saccus narrower than in *S. insularis*. Typical differences between both species can be found in the form of the valves: ventral process more slim, little shorter and less bent than in insularis, central process more developed, and dorsal processus reduced to a dorsal curve of the valve. Lateral process of the juxta longer and ending with a tip which is a little sclerotized in some specimens. Aedeagus much shorter than in *insularis,* only $^{3}/_{4}$ to $^{4}/_{5}$ as long as in *insularis*. Vesica with three bulbs, two smaller lateral ones and a dorsal one with a typical large sclerite medially, which is much less developed or even missing sometimes in Javanese *S. insularis*.

♀: Same color and pattern as in males, but with typical different form of wings and different sizes as follow: Antenna quadripectinate, with ca. 30 segments (last 4 reduced, bipectinate), 7.6 to 9.1 mm long (average 8.4 mm, n = 2), rami in maximum 1.5 to 1.7 mm (average 1.6 mm, n = 2). Right forewing length 60 to 70 mm (average 65 mm, n = 2), ocellus 14 to 17 mm long, subapical spot 4.5 to 5 mm in maximum diameter. On the hindwing ocellus more halfmoon like, 10 to 12 mm in diagonal maximum diameter (average 11 mm, n = 2).

Distribution: *S. abrerai* is known only from the Indonesian islands of Bali and Java, and was found on Java to fly sympatrically with *S. insularis;* in Bali it is the only known representative of the genus.

Samia naessigi spec. nov.

Holotype (figs. 3, 4): ♂, Indonesia, Maluku Utara, Halmahera (Nordwest), Stichstraße Baru–Basale, ca. 500 m, 6 March 1997, 03.00 h, leg. Stefan Naumann (Naumann). A red holotype label will be fixed accordingly. The holotype will be deposited in the ZMHB in Berlin when the revision of the genus is completed.

Paratypes (11 ♂♂, 4 ♀♀)

Allotype: ♀, Stichstraße Baru–Basale, ca. 500 m, 6 March 1997, 00.55 h, leg. S. Naumann (ZMHB).

A red allotype label will be fixed accordingly. The other paratypes with blue paratype labels:

1 ♂, [Indonesia], Halmaheira, Tobelo, bought by E. Le Moult (BMNH); 2 ♀♀, Mt. Talagarama, 15 km SE Baru, 600 m, 127°32'E 1°12'N, primary forest, 22–31 Jan 1996, leg. V. Sinjaev (Brechlin); 1 ♂, Halmahera (Nordwest), Stichstraße Baru–Basale, ca. 550 m, 4 March 1997, 04.40 h, leg. S. Naumann (Peigler); 2 ♂♂, Halmahera (Nordwest), Stichstraße Baru–Basale, ca. 550 m, 5 March 1997, 04.25 & 05.10 h, GP 78/97 & 79/97 Naumann, leg. S. Naumann (Naumann); 1 ♂, Stichstraße Baru–Basale, ca. 500 m, 6 March 1997, 03.50, leg. S. Naumann (Naumann); 1 ♂, same locality, 7 March 1997, 04.50 h, leg. S. Naumann (Naumann); 1 ♂, Gunung Api Gamkonora, ca. 5 km E Baru, 350 m, 8 March 1997, 02.40 h, leg. S. Naumann (Naumann); 2 ♂♂, Gunung Gagagutu, 16

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April–9 May 1997, leg. A. Sumbala (Naumann); 1 ♂, Gunung Saululu, Nov/Dec 1998, leg. A. Sumbala (Naumann); 1 ♂1 ♀, without data, June 1998, GP 709 Paukstadt, leg. local people (Paukstadt).

Some specimens ex coll. Naumann will be deposited in SMFL and ex coll. Peigler in LACM.

Derivatio nominis: The species is dedicated to Dr. Wolfgang A. Nässig of the Senckenberg-Museum in recognition of his work on the Saturniidae and in appreciation of his long-term assistance to our studies.

Description. ♂: Ground color purple to orange brown, antenna quadripectinate, with 31–32 segments (the last 6 reduced, bipectinate), 9.8 to 11.9 mm long (average 11.1 mm, n = 9), rami in maximum 1.9 to 2.4 mm (average 2.2 mm, n = 9). Frons lighter, thorax and abdomen in ground color, each separated by whitish collar, the same as with the basis of the antenna and one dorsal and two lateral rows of abdominal tufts.

Right forewing length 61 to 78 mm (average 72.9 mm, n = 9, holotype 78 mm), one of the largest *Samia* species. Wings with typical *Samia* pattern, but species typical elements: Antemedian area suffused with pink scales, and ending in a white antemedian band which posterior is dark brown. Ocellus 12 to 16.5 mm long, without anterior black border, and same sized hyaline and posterior yellow part, the tip bulding the postmedian band a little, in few specimens perforating this band. Anterior to the postmedian band a dark suffused, nearly black area, then a narrow and nearly straight white and pinkish white band. On the postmedian area the basal angle of the wing with a small orange field, the long outwardly pointed forewing apex colored violet at the top and more orange brownish around the large, 5.5 to 7 mm in maximum diameter subapical ocellus. All specimens have a more or less developed black dot below this ocellus.

The same colors on the hindwing which is due to its straight inner and outer margin appearing nearly triangular. Posterior to the yellow part of the hindwing ocellus which is 9 to 12 mm in diagonal maximum diameter, a nearly black area can be found. On the underside all pattern elements, but antemedian band and the black dot below the forewing ocellus are missing, and all colors are less intensive.

♂ genitalia (fig. 10): Saccus quite large, a little angular. Valves very similar to that of *S. ceramensis* (Bouvier 1927) and *S. naumanni* Paukstadt, Peigler & Paukstadt 1998, with a longer ventral process, a blunt small central one and a much reduced dorsal one, aedeagus with left lateral spine, vesica with three bulbs, in some specimens with a fourth small outlined bulb left laterally. While *S. naumanni* has no sclerite and *S. ceramensis* an acute one on the dorsal bulb, there is only a small round sclerite at this place in *S. naessigi*.

♀: Same color and pattern as in males, but with typical different form of wings and different sizes as follow (only one specimen available for measurements): Antenna quadripectinate, with ca. 32 segments (the last 6 reduced, bipectinate), 11.2 mm long, rami in maximum 2 mm. Right forewing length 83 mm, ocellus 17 mm long, subapical spot 7 mm in maximum diameter. On the hindwing ocellus more halfmoon like, 12 mm in diagonal maximum diameter and with very large hyaline part. The pink outer portion of the postmedian line is even more intensive than in the male specimens.

Distribution. *S. naessigi* is known thus far only from the Moluccan island of Halmahera, but it may be anticipated to occur also on the adjacent smaller islands of Ternate, Tidore, Morotai, Obi or Bacan, all in North Moluccas Province (Maluku Utara) in eastern Indonesia.

Samia kohlli spec. nov.

Holotype (figs. 5, 6): ♂, West Malaysia, Pahang prov., Cameron Highlands, Tanah Rata, 18 Jan 1998, leg. local collector, via Steve Kohll, Luxemburg, CSNB. A red holotype label will be fixed accordingly. The holotype will be deposited in the ZMHB in Berlin when the revision of the genus is completed.

Paratypes (82 ♂♂, 31 ♀♀), all from West Malaysia:

Allotype: ♀, West Malaysia, Pahang province, Cameron Highlands, 3 km N Brinchang, 1350 m, ex wild female, ex ovo in D auf *Ligustrum ovalifolium* 14. July 1998, ca. 19.00 h, leg. Steve Kohll, Zucht Stefan Naumann (ZMHB).

A red allotype label will be affixed on the pin. The other paratypes will be given blue paratype labels:

4 ♂♂, 1 ♀, Genting Highlands, 1500 m, 1 ♂ Feb 1981, 3 ♂♂, 1 ♀ March 1981 (Lampe); 2 ♂♂1 ♀, Genting Highlands, ca. 1800 m, leg. L. K. Tong, via W. A. Nässig (Peigler); 4 ♂♂, 2 ♀♀, Pahang, probably Genting Highlands, Hotelareal, ca. 1800 m, leg. local collector via Loh Khai Tong, GP 370 & 470/86 Nässig (Nässig); 2 ♂♂, Pahang, Genting oder Cameron Highlands, 4500–5500 ft, leg. local collector 1978–85, bought March 1986 from L. K. Tong (Nässig); 3 ♂♂, 2 ♀♀, Cameron Highlands, 900 & 950 m, 2 ♂♂, 2 ♀♀ Nov 1982, 1 ♂ Feb 1984 (Lampe); 30 ♂♂, 6 ♀♀, Pahang, Cameron Highlands, Kampong Raja, ca. 1600 m, 1 ♂ 9 Oct 1994, 7 ♂♂, 1 ♀ 15 Feb 1995, 3 ♂♂, 2 ♀♀ 17 Feb 1995, 2 ♂♂ 20-25 March 1995, 1 ♂, 1 ♀ 25 March 1995, 16 ♂♂, 2 ♀♀ 15 Feb–10 March 1996, leg R. Chong, GP 1029–1034 Paukstadt (Paukstadt); 1 ♂, 1 ♀, same data, 14 Feb 1995, via Paukstadt (Brechlin); 5 ♂♂ Pahang, Cameron Highlands, Tana Rata, ca. 1400 m, 1 ♂ March–May 1995, 1 ♂ Sep–Dec. 1995, 1 ♂ Dec. 1995, 2 ♂♂ Dec 1995–March 1996, leg. local people, via Fatt Seng, GP 1035 & 1036 Paukstadt (Paukstadt); 1 ♂, same data, March–May 1995 (Brechlin); 1 ♂, Cameron Highlands, Tana Rata, 1400 m, May–July 1995 (Peigler); 1 ♂, Pahang, Kampung Raja, 1600 m, 15 Feb 1996, leg. R. Chong, via Paukstadt (Beeke), 1 ♂, same data (Brosch); 1 ♂, Cameron Highlands, Tana Rata, Robinson Waterfalls, 29 Oct 1994, 23.00 h, leg. S. Kohll (Kohll); 1 ♂, Pahang, Cameron Highlands, Tana Rata, 21 March 1984, leg. M. Lüttgen (Nässig); 1 ♂, Cameron Highlands, Tanah Rata, ca. 1500 m, Dec 1993–Feb 1994, leg. W. T. Fatt (Naumann); 3 ♂♂, Pahang prov., Cameron Highlands, Tanah Rata, 18 Jan 1998, leg. local collector via S. Kohll, GP 297/89 Naumann (Naumann); 2 ♂♂, 1 ♀, Cameron Highlands, 6 km S Tana Rata, 1250 m, ex larva 4 & 8 April 1998, larvae collected on *Cinnamonum camphora,* leg. S. Kohll (Kohll); 2 ♂♂, Cameron Highlands, 6 km S Brinchang, 1250 m, 26 Feb 1998, leg. S. Kohll (Kohll); 1 ♀, Cameron Highlands, 3 km N Brinchang, 1350 m, 21 Feb 1998, leg. S. Kohll (Kohll); 4 ♂♂, 9 ♀♀, same locality, ex wild coll. female, ex ovo in D on *Ligustrum ovalifolium,* 1 ♂

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31 May, 2 ♂♂, 4 ♀♀ June, 1 ♀ 3 June, 1 ♀ 5 June, 1 ♀ 6 June, 1 ♀ 28 June, 1 ♂ 13 July, 23.00 h, 1 ♀ 14 July, 22.00 h, GP 327/98 Naumann (Naumann); 1 ♀, same data, 23 July 1998 (Peigler); 1 ♂, 1 ♀, Cameron Highlands, 1500 m, early March 1999, leg. R. Zenker (MTD); 3 ♂♂, 2 ♀♀, Cameron Highlands, 1–10 March 1999, leg. P. Spona (Löffler); 3 ♂♂, Frasers Hill, 1–14 March 1999, leg P. Spona (Naumann); 1 ♂, Kampong Sahom, ca. 1982, leg. H. F. Wong, GP 32/96 Naumann (Naumann); 2 ♂♂, Perak, Taiping env., 24 Jan 1983 & April 1988 (Beeke); 1 ♂, same locality, 20 March 1992 (Brosch).

Some of the paratypes ex colls. Naumann and Peigler will be deposited in institutional collections (BMNH, LACM, MHNL, UMO, ZMHB).

Derivatio nominis: This species is dedicated to Steve Kohll, Luxembourg, who obtained livestock of this species during an expedition to Cameron Highlands, and kindly made that material and his field observations available to the senior author, who was also therefore able to carry out a successful breeding. The preimaginal instars will be described and figured in the forthcoming revision.

Description. We describe here the typical West Malaysian population that is very consistent in pattern and color, which is also the reason we limited the type series to that region, the southernmost area of its known distribution. *S. kohlli* generally is a highly variable species and in some areas resembles other sympatric species like *S. canningi* Hutton 1859, or *S. wangi* spec. nov., described below, but always can be easily recognized and separated by the diagnostic male genitalia structures.

♂**:** Ground orange brown, antenna quadripectinate, with ca. 31 segments (the last 6 to 7 reduced, bipectinate), 12.0 to 12.8 mm long (average 12.3 mm, n = 10), rami in maximum 2.4 to 2.6 mm (average 2.5 mm, n = 10). Frons, thorax and abdomen also in ground color, each separated by whitish collar, and abdomen with one dorsal and two lateral rows of abdominal tufts.

Right forewing length 74 to 79 mm (average 76.5 mm, n = 10, holotype 76 mm), wings with typical *Samia* pattern, but species-specific elements: Ante- and postmedian area lighter than median area, antemedian band whitish with posterior blackish scales. The ocellus 15.5 to 18 mm long, anterior with up to 0.8 mm broad black part, then the hyaline and the broad yellow part following, postmedian band well defined by clear black bordered white, intensively pink and whitish pink lines, indented by the forewing ocellus. The postmedian area broadly in ground color, the apex very tall and falcate, colored violet, the subapical ocellus 4.5 to 5 mm in maximum diameter.

The form of the hindwing quite rounded, in the same color as forewing; ocellus formed like a halfmoon, 11 to 12 mm in diagonal maximum diameter, anterior with narrow black border before the hyaline part, the yellow posterior part without any additional black marking further posterior.

The underside in this species colored like dorsal, antemedian band only slightly suffused on the forewing, on the hindwing absent, also all black pattern elements of ante- and postmedian line absent, and postmedian area especially on the hindwing more pinkish than dorsal.

♂ **genitalia** (fig. 11): Saccus long and narrow, a little triangular. Valves with typical form: A small sacculus, the ventral processus which is the most prominent and longest one, is sitting very low ventrally so that there is nearly no ventral edge on the margin. Central process less developed and blunt, dorsal processus nearly reduced to a rectangular lobe. Aedeagus with left ventrolateral thornlike process, vesica with three bulbs: the large dorsal one with a sclerite, a smaller left lateral one and a right one more distally which is reduced in some specimens only to a small curvature.

♀**:** Same color and pattern as in males, but with typical different form of wings and different sizes as follow: Antenna quadripectinate, with ca. 34 segments (the ca. last 9 reduced, only bipectinate), 12 to 13 mm long, rami in maximum 1.9 to 2.1 mm. Right forewing length 82 to 84 mm, ocellus 17 to 18 mm long, subapical ocellus 5.5 to 6 mm in maximum diameter. On the hindwing ocellus more halfmoon-like, 13 to 14 mm in diagonal maximum diameter.

Distribution: *S. kohlli* is described only from West Malaysian populations, but specimens are also known from Myanmar, Thailand, Laos, Vietnam, China, and Tibet. An exact list of localities and notes on variation of that species will be published in the revisional work.

Samia wangi spec. nov.

Holotype (figs. 7, 8): ♂, China, Guangdong Province, Huiji, Duang Mt., 1500 m, July 1998, leg. Yin, coll. Stefan Naumann. A red holotype label will be fixed accordingly. The holotype will be deposited in the LACM in Los Angeles when the revision of the genus is finished.

Paratypes (76 ♂♂, 15 ♀♀ from China, 65 ♂♂, 27 ♀♀ from Taiwan):

Allotype: ♀, China, Guangdong Province, Huiji, Duang Mt., 1500 m, July 1998, leg. Yin, coll. Stefan Naumann (LACM). A red allotype label will be fixed accordingly. The other paratypes with blue paratype labels:

5 ♂♂, **China, Guangdong Province,** Dianbai, ca. 111°20'E 21°30'N, Sept. 1997, leg. Li, GP 212–214/97 Naumann (Naumann); 7 ♂♂, Huiji, Duang Mt., ca. 112°10'E 23°54'N, 1500 m, July 1998, leg. Yin, GP 366 & 367/99 Naumann (Naumann); 1 ♂, Shixin, Danxia Mt., ca. 114°04'E 25°00'N, 1300 m, May 1997, leg. Li, GP 267/98 Naumann (Naumann); 4 ♂♂, 3 ♀♀, Canton [Guangzhou], ex pupa March & April 1912, April & May 1914, coll. R. Mell (ZMHB); 1 ♀, **Hong Kong,** Tai Mo Shan, 450 m, ex larva on *Ilex asprella* Champ, 24 May 1992, leg. K. H. K. Li (Naumann); 4 ♂♂, New Territories, Uk Tan, Sai Sung, sea level, 25–28 April 1998, coll. C. G. Treadaway, GP 320 & 321/98 Naumann (SMFL); 1 ♂, ex pupa 1 March 1908, coll. Staudinger, GP 182/97 Naumann (ZMHB); 1 ♀, 4 April, coll. Staudinger (ZMHB); 1 ♂, 1925, coll. Oberthür, GP 226/97 Naumann (MNHN); 1 ♀, **Macao,** 1909, coll. Poujade (MNHN); 2 ♂♂, **Hunan Province,** East Hunan, Guidong, Bamia Mt., ca. 113°56'E 26°04'N, 1600 m, leg. Wang (Naumann); 4 ♂♂, Zhengzhou, ca. 113°00'E 25°48'N, Sept. 1997, leg. Z. (Naumann); 22 ♂♂, 4 ♀♀, **Jiangxi Province,** West Jiangxi, Jingang Mt., 400–500 m, leg. Wang, GP 16–18/96, 95–97/97, 100/97 Naumann (Naumann), 4 ♂♂,

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same data (Peigler); 14 ♂♂, 1 ♀, **Fujian Province,** South Fujian, N. Yongding county, Chitonyian Mt., ca.116°42'E 24°42'N, 1540 m, April 1998, leg. Wang & Li, GP 296/98, 368 & 369/99 Naumann (Naumann); 7 ♂♂, 3 ♀♀, Yongan, Baiyian Mt., 117°20'E 25°58'N, 1500 m, July 1997, leg. Li (Naumann).

Taiwan, 2 ♂♂, **Taitung County,** 2 km N Tupan, 120°52'E 22°29'N, 500 m, 16 Oct 1995, leg. T. Csovary & P. Steger (Witt); 5 ♂♂, 4 km N Tupan, 120°52'E 22°28'N, 390 m, 13–14 Aug 1996, leg. T. Csovary & L. Mikus (Witt); 1 ♂, same locality, 1 July 1997 (Witt); 1 ♂, same locality, 3 July 1997 (Witt); 3 ♂♂, 3 km W Hungyeh, 120°52'E 23°28N, 350 m, 15–16 Aug 1996, leg. T. Csovary & L. Mikus (Witt); 3 ♂♂, 1 ♀, same data (Brechlin); 2 ♂♂, 2 km S Liyusan, 1760 m, 21 Oct 1996, leg. G. Fábián & F. Nemes (Witt); 2 ♂♂, 1 ♀, 3 km W Hungyeh, 120°52'E 22°28'N, 350 m, 5 Nov 1996, leg. T. Csovary & C. Szaboky (Witt); 1 ♂, 2 ♀♀, same locality, 30 June 1997 (Witt); 1 ♂, same locality, 5 July 1997, leg. T. Csovary & L. Mikus (Witt); 1 ♂, same locality, 12 July 1997 (Witt); 1 ♀, same locality, 1 Jan 1997, leg. C. Szaboky & I. Soos (Witt); 1 ♀, 7 km E Taimali, 120°56'E 22°41'N, 710 m, 30 May 1997, leg. C. Szaboky & I. Soos (Witt); 2 ♂♂, same locality, 13 July 1997, leg. T. Csovary & L. Mikus (Witt); 1 ♂, **Nantou County,** Lushan Spa, 1200 m, 29 April–1 May 1984, leg. H. Yoshimoto (Naumann); 2 ♀♀, Wushe, 8 July 1981 and 31 March 1987 (TM); 1 ♂, 3 km E Tili, 120°58'E 23°47'N, 555 m, 31 March 1996, leg. T. Csovary & P. Steger (Witt); 3 ♂♂, Ursun F., 16 km E Kuohsing, 121°00'E 24°05'E, 560 m, 20–21 July 1996, leg. T. Csovary & L. Mikus (Witt); 1 ♀, Tayuling, 2750 m, 19 April 1997, leg. G. Fábián & S. T. Kovács (Witt); 4 ♂♂, 1 ♀, Tungpu, Yu-Shan Nat. Park, 1400 m, 24–25 April 1997, leg. G. Fábián & S. T. Kovacs (Witt); 2 ♂♂, 2 ♀♀, 3 km SW Tsuifeng, 121°10'E 24°06'N, 2100 m, 7 Aug 1996, leg. T. Csovary & L. Mikus (Witt); 1 ♂, **Taoyuan County,** 14 km E Fushing, 121°23'E 24°50'N, 800 m, 18 May 1995, leg. M. Hreblay & P. Steger (Witt); 2 ♂♂, same locality, 24–25 May 1995, GP 28/96 Naumann (Witt); 1 ♂, 16 km E Fushing, 121°24'E 24°50'N, 870 m, 5 Oct 1997, leg. T. Csovary & P. Steger (Witt); 2 ♂♂, same locality, 21 May 1997, leg. C. Szaboky & I. Soos (Witt); 3 ♂♂, 1 ♀, same locality, 22 Aug 1996, leg. T. Csovary & L. Mikus (Brechlin); 1 ♂, **Taipei County,** Wulai, 16 July 1968, leg. S. Suzuki, ex coll. Arita, GP 440/99 Naumann (Naumann); 1 ♀, Wulai, 12 Sept 1986 (TM); 2 ♂♂, Pi Hu, 121°45'27"E 24°54'02"N, 450 m, 4–5 April 1997, leg. L. Peregovits & A. Kun (Witt); 1 ♂, 10 km SE Pinglin, Pihou, 450 m, 16 April 1997, leg. G. Fábián & S. T. Kovács (Witt); 4 ♂♂, 1 ♀, **I-Lan County,** Guisandao Islet, 16 April 1998, H. Y. Wang (TM); 1 ♂, Fushan, 700 m, 121°34'E 24°45'N, 9 Sept 1999, leg. G. Csorba & B. Herczig (Löffler); 1 ♂, **Kaohsiung County,** Lukuei, 4–5 Sept 1989, leg. C. S. Lin, GP 274/98 Naumann (TNM); 1 ♀, **Pingtung County,** Kentine, 7–10 Jan 1991, leg. C. S. Lin (NMN); 1 ♀, 1 km S Shinen, 120°45'E 22°08'N, 250 m, 14 Oct 1995, leg. T. Csovary & P. Steger (Witt); 1 ♂, 1 ♀, 10 km NW Saulin, 120°46'E 22°05'N, 350 m, 21 March 1996, leg. T. Csovary & P. Steger (Witt); 1 ♂, 1 ♀, same locality, 12 Aug 1996, leg. T. Csovary & L. Mikus (Brechlin); 1 ♀, road no. 199, 120°51'51"E 22°14'38"N, 500 m, 19 April 1997, leg. L. Peregovits & A. Kun (Witt); 1 ♂, 5 km W Chipen, 470 m, 27–28 April 1997, leg. G. Fábián & S. Kovács (Witt); 1 ♂ **without exact locality,** Koamania, July 1907, coll. A. E. Wileman (BMNH); 2 ♂♂, Kanshirei, 1000 ft., 19 April 1908, coll. A. E. Wileman (BMNH); 1 ♂, 2 ♀♀, Taiwan, bought by Peigler in 1974 from Mrs. Chang Pi-Tzu (Peigler), 1 ♂, same data, GP 127/97 Naumann (Naumann); 2 ♂♂ (GP Nässig 368/86, 413/86), 4 ♀♀ Taiwan, pupae bought from Ying Min Wu, e.p. Mid-Aug. 1980 (Nässig); 1 ♂ (GP Nässig 440/86), 1 ♀ Wuso, 10. VII. 1983, specimens bought from P. T. Chang, Dec. 1984 (Nässig).

Some of the paratypes ex colls. Naumann and Peigler will be deposited in institutional collections (AS, LACM, SAF, ZFMK).

Derivatio nominis: This new species is named in honor of Hsiau Yue Wang of the Taiwan Museum in recognition of his important work as an author and photographer to document the insect fauna of Taiwan, especially the Lepidoptera. Color figures of living adult moths and immature stages of this species were published by him (e.g. Wang 1988: 46 ff., Wang 1994: 88 ff., Peigler & Wang 1996: 77 ff.). Mr. Wang has kindly assisted our studies of Saturniidae many times in recent years.

This species was erroneously cited in most literature under the name *Samia walkeri,* a name that is now known to be a junior subjective synonym of *S. cynthia.*

Description. We describe here the typical Guangdong population from the type locality of the holotype; there is a little variation between each population in the large area of distribution of that species; e.g. specimens from Taiwan look a little lighter, as well as the eastern and western mainland Chinese populations tend to have more greenish elements than the southern more brownish ones from lowland. Measurements also are only from Guangdong specimens.

♂**:** Ground color dark purple brown, antenna quadripectinate, with ca. 29 segments (the last 6 reduced, bipectinate), 11.0 to 12 mm long (average 11.5 mm, n = 14), rami in maximum 2.0 to 2.4 mm (average 2.2 mm, n = 14). Frons lighter, thorax and abdomen in ground color, each separated by whitish collar, the same as with the basis of the antenna and one dorsal and two lateral rows of abdominal tufts.

Right forewing length 63 to 75 mm (average 68.9 mm, n = 14, holotype 70 mm), wings with typical *Samia* pattern, but species typical elements: Antemedian area lighter than ground color, with dark pink scales near the proximal white and posterior black bordered antemedian band. Median area in ground color, the forewing ocellus anterior with narrow black border, then ca. 1 mm broad hyaline area and 0.8–1.3 mm in maximum yellow posterior part; ocellus 14–18.5 mm long and always bulging, sometimes even perforating the bent posterior band. This band from anterior to posterior with black shadow, white, intensive pink and pinkish-white area; the intensive pink areas more or less developed so that there are both specimens with broad pink or broad pinkish-white portions. Postmedian area in ground color, but suffused with black scales, the forewing apex tapering, but not as falcate as e.g. in *S. kohlli,* and colored in violet. Subapical ocellus 4 to 5 mm in maximum diameter. All the same pattern and colors also on hindwing, ocellus halfmoon-like, 9.5 to 12.5 mm in diagonal maximum diameter, outer margin quite rounded.

On the underside anterior to the fore- and hindwing ocellus all pattern elements missing, posterior like dorsal, slightly less intensive colored.

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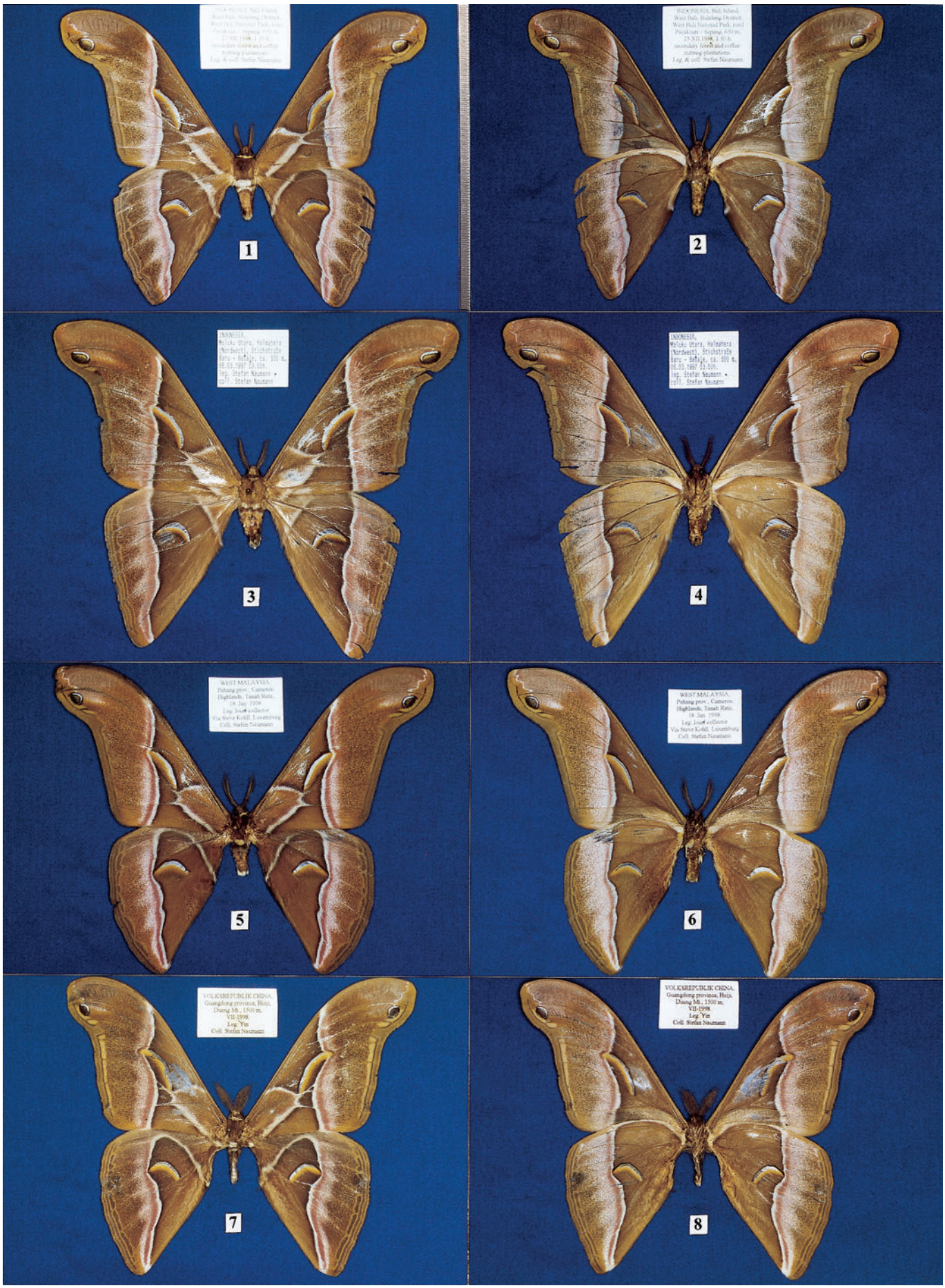

Color plate. Fig. 1: Holotype ♂ *Samia abrerai* spec. nov., dorsal view, Bali Island. **Fig. 2:** Same specimen, ventral view. **Fig. 3:** Holotype ♂ *Samia naessigi* spec. nov., dorsal view, Halmahera Island. **Fig 4:** Same specimen, ventral view. **Fig. 5:** Holotype ♂ *Samia kohlli* spec. nov., dorsal view, West Malaysia. **Fig. 6:** Same specimen, ventral view. **Fig. 7:** Holotype ♂ *Samia wangi* spec. nov., dorsal view, China, Guangdong. **Fig. 8:** Same specimen, ventral view. — All specimens figured at the same scale, 1 scale 0,5 mm; photographs by S. NAUMANN.

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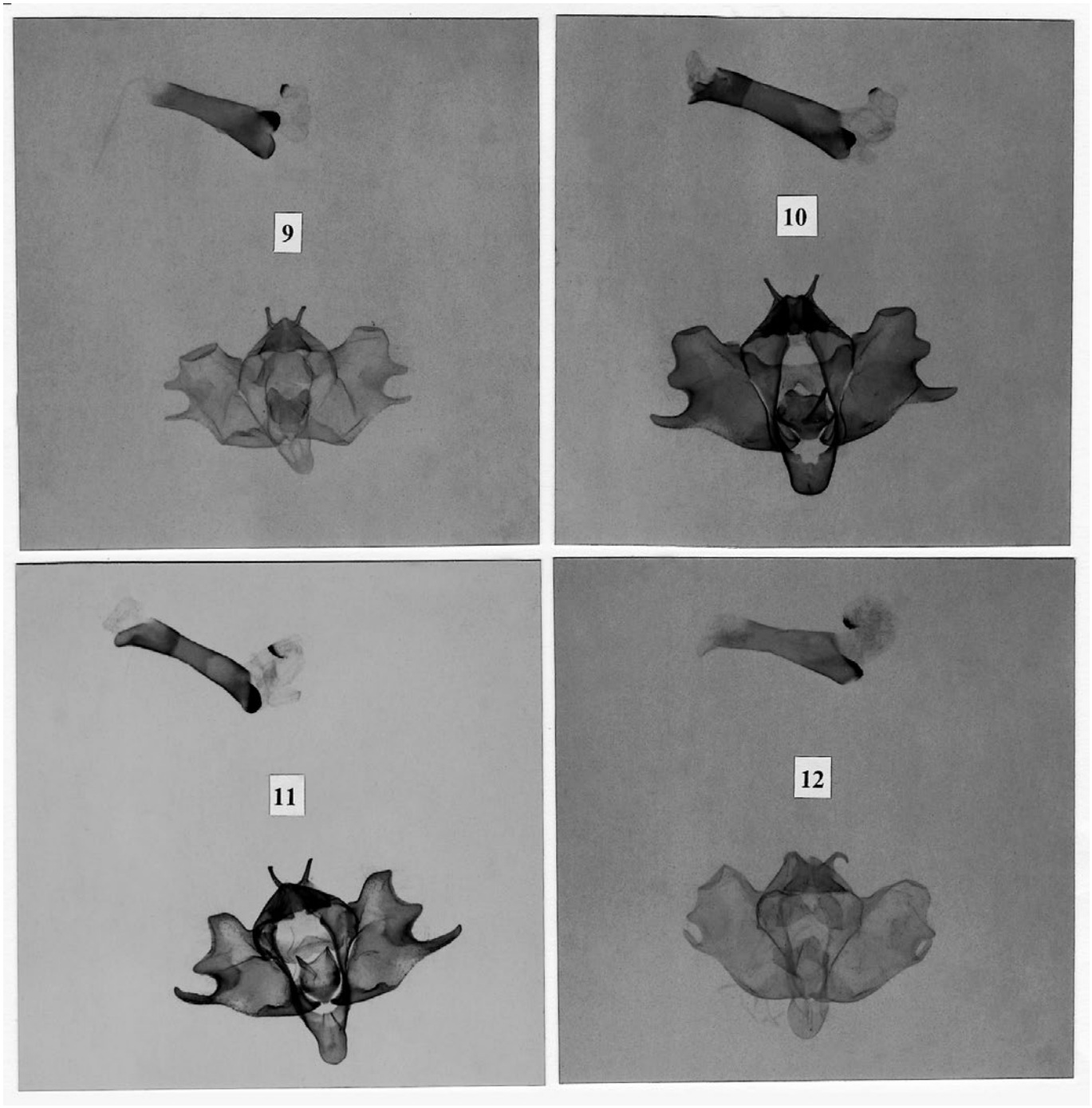

Black & white plate. Fig. 9: ♂ genitalia of *Samia abrerai* spec. nov., paratype, Bali Island, dissection no. 275/98 Naumann. **Fig. 10:** ♂ genitalia of *Samia naessigi* spec. nov., paratype, Halmahera Island, dissection no. 79/97 Naumann. **Fig. 11:** ♂ genitalia of *Samia kohlli* spec. nov., paratype, West Malaysia, dissection no. 297/98 Naumann. **Fig. 12:** ♂ genitalia of *Samia wangi* spec. nov., paratype, China, Guangdong, dissection no. 267/98 Naumann. — All figures to the same scale. Photographs by U. Brosch.

♂ genitalia (fig. 12): Aedeagus as long as broad at its basis, a little tapering; valves with sacculus over one third of the length, this sacculus ending with a curved outer margin of the ventral part of the valve, going further dorsally. The ventral process compared with other species relatively short and starting very far dorsally, nearly at half way to the dorsal tip. Central process shorter and much broader and rounded, dorsal process totally reduced to a lobe. Aedeagus long and tall, with left ventrolateral spine, vesica with three bulbs as usual in most *Samia* species: a large one dorsally with sclerite medially, and two bulbs right and left laterally which are smaller.

♀: Same color and pattern as in males, but with a typically different form of wings and different sizes as follows (only allotype data): Antenna quadripectinate, with ca. 34 segments (ca. last 8 reduced, bipectinate), ca. 10 mm long (not totally complete), rami in maximum 1.8 mm. Right forewing length 74 mm, ocellus 19 mm long, subapical spot 4.5 mm in maximum diameter. On the hindwing ocellus more halfmoon like, 13.5 mm in diagonal maximum diameter.

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Distribution: Type material of *S. wangi* was selected only from southeastern mainland provinces of the People's Republic of China and from Taiwan, but according to our concept of this species, it is also widespread in the southern lowland and lower mountainous, subtropical parts of China plus northern Vietnam. A complete discussion of the known distribution and habitats will be published in our revision.

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